Superfund Proposed Plan

Hooker Chemical/Ruco Polymer

Hicksville
Nassau County, New York

EPA
Region 2

SDMS Document
112799

August, 1993

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Hooker Chemical/Ruco Polymer Superfund site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). The U.S. EPA, is issuing the Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP). The alternatives summarized here are described in the Remedial Investigation and Feasibility Study (RI/FS) reports which should be consulted for a more detailed description of all the alternatives.

This Proposed Plan is being provided as a supplement to the RI/FS report to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative.

The remedy described in this Proposed Plan is the <u>preferred</u> remedy for the site. Changes to the preferred remedy or a change from the preferred remedy to another remedy may be made, if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. We are soliciting public comment on all of the alternatives considered in the detailed analysis of the RI/FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS reports, Proposed Plan, and supporting documentation has been made available to the public for a public comment period which begins on August 23, 1993 and concludes on September 22, 1993.

A public meeting will be held during the public comment period at the Hicksville Elks Lodge - No. 1931, 80 East Barclay Street, Hicksville, New York, on September 8, 1993 at 7:00 pm to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

All written comments should be addressed to:

Dale J. Carpenter
26 Federal Plaza, Room 747
New York, New York 10278
Phone Number (212) 264-9342

Dates to remember:
MARK YOUR CALENDAR

August 23, 1993 to September 22, 1993

Public comment period on RI/FS report, Proposed Plan, and remedies considered

September 8, 1993

Public meeting at the:

Hicksville Elks Lodge - No. 1931
80 East Barclay Street
Hicksville, New York 11801
7:00pm

Copies of the RI/FS report, Proposed Plan, and supporting documentation are available at the following repositories:

Hicksville Public Library
169 Jerusalem Avenue
Hicksville, New York 11801
(516) 931-1417
Hours: M-F 10-9, Sat 10-5

and

U.S. EPA - Region II
26 Federal Plaza
New York, New York 10278
(212) 264-8770

SITE BACKGROUND

The Hooker Chemical/Ruco Polymer site, also called the Hooker/Ruco site, is an active chemical manufacturing facility located in a heavily industrialized section of Hicksville, Nassau County, New York (See Figure 1). The site, located off of New South Road in Hicksville, was developed by the Rubber Corporation of America, a small privately held company. Operations at the site began in 1945 and included natural latex storage, concentration and compounding. Five years later the company began producing small volumes of plasticizers. These activities were expanded and modified through the years. In 1956, a polyvinyl chloride plant was built and was initially operated under the name of Insular Chemical Corporation. At that time the two companies, Insular Chemical Corporation and the Rubber Company of America, occupied the site. Although they were two separate corporations, they shared the same pilot plant. The two companies eventually merged into the Rubber Corporation of America. In 1965, the company was purchased by the Hooker Chemical Company and was known and operated as the Ruco Division. Hooker Chemical has undergone several name changes, with the current name being Occidental Chemical Company (Occidental). In 1982, the employees bought the company from Occidental and it became known as the Ruco Polymer Corporation (not affiliated with Occidental Chemical Company).

The Ruco Polymer plant, currently owned and operated by the Ruco Polymer Corporation (Ruco), contains four buildings for the manufacture and storage of chemical products (Plants 1,2,3 and the Pilot Plant, See Figure 1.2) and an administration building. The remainder of the 14 acre site contains parking areas, chemical storage tanks, 4 recharge basins (sumps) and small ancillary buildings. The facility currently manufactures polyester, polyols and powder coating resins.

The major industrial facilities in the area are the Grumman Aerospace Corporation (Grumman) Bethpage manufacturing facility and airport and the U.S. Naval Weapons Industrial Reserve Plant (NWIRP). There are other small industries, commercial operations, utilities, and transportation corridors in the area. Residential neighborhoods are in close proximity to and surround the industrial area. The Hooker/Ruco Site is physically bounded by the LIRR tracks to the southwest, New South Road to the West, Commerce Drive to the north and the Grumman facility to the east and south.

The industrial area, including the Site, as well as the surrounding residential areas are above the groundwater aquifer that supplies the surrounding communities with water. The aquifer on Long Island is designated a sole source aquifer.

Since 1946, the facility was used for the production of various polymers, including: polyvinyl chloride (PVC), polyesters, polyurethanes, vinyl film sheeting, pelletized plastic compounds, styrene/butadiene latex, vinyl chloride/vinyl acetate copolymer, and polyurethane, as well as ester plasticizers. This facility is currently active and manufactures such products as polyester, polyols and powder coating resins.

During site operations between 1956 to 1975, industrial wastewater and stormwater from the facility was discharged to six (6) on-site recharge basins or sumps. This wastewater contained, among other things, vinyl chloride, trichloroethylene, barium and cadmium soap, vinyl acetate, organic acids, and styrene condensate. From 1951 to 1974, process wastewater from ester production was fed to Sump 1. Sump 2 received any overflow from Sump 1 as well as stormwater runoff from the site. Sump 1 was then partially backfilled and a series of six concrete settling basins were installed. From 1975 to 1991 the concrete settling basins were used to store process wastewater from ester production prior to being incinerated on-site. These wastewaters are presently stored in an on-site, above ground tank prior to off-site disposal or incineration on-site. Sump 3 currently receives the surface-water runoff from a large part of the plant, including most of the manufacturing areas. Sumps 4, 5 and 6 received wastestreams from Plant 2 processes. Sumps 4 and 5 were the primary recipients of the discharges, with Sump 6 added in 1962 to handle any intermittent overflow. Sump 4 is currently used for the discharge of blowdown from the non-contact cooling water system. Sumps 5 and 6 have been completely backfilled.

As a result of these releases, groundwater beneath and downgradient from the site has been contaminated. Limited areas of residual soils contamination exist above levels that would be considered protective of groundwater quality.

From 1946 to 1978, the Pilot Plant used a heat transfer fluid called Therminol, which contained PCBs. During the operation of the facility, there was a release of PCBs to the soil adjacent to the pilot plant. Some of this contaminated soil was spread to surrounding areas by surface-water run-off, sediment transport, and truck traffic. Since 1984, Occidental has conducted several investigations to determine the extent of PCB and other soils and groundwater contamination at the Ruco Polymer plant. In 1989, an underground fuel oil storage tank adjacent to Plant 1 was removed, and the soils surrounding the tank were excavated, sampled, and found to be contaminated with PCBs. These excavated soils were covered with plastic sheeting, pending the remediation of the other PCB-contaminated soils on the site.

The site was placed on the National Priorities List (NPL) in 1984. Initially, negotiations by NYSDEC and EPA failed to reach a settlement with the potentially responsible parties (Occidental Chemical and Ruco Polymer) to conduct the RI/FS for the site. Therefore, EPA issued a work assignment to its contractor, Ebasco Services Inc., to prepare a work plan and conduct the RI/FS. However, in September 1988, after the work plan was finalized, Occidental agreed to perform the work. In September 1989, RI/FS field work commenced. Field work was completed in February 1990 and a draft RI Report was submitted in April 1990. Portions of the RI Report pertaining to the PCB contaminated areas were approved to expedite the remediation of those areas. The final, complete RI report was approved in December, 1992.

In order to expedite action to deal with the most immediate human health threats at the site first, separate distinct remedial actions or "operable units (OUs)" were established. The OUs are for this site are divided as follows:

- OU 1: Covers the majority of the Ruco property; soil and groundwater contamination from previous disposal activities.
- OU 2: Addressed the PCB-contaminated soils.
- A third area of concern: Contaminated groundwater downgradient of the Ruco property boundary.

As stated above, the RI Report for OU 1 was approved in December 1992 by the EPA. The FS Report containing the various alternatives to address the OU 1 contamination was approved in August, 1993. This Proposed Plan addresses OU 1.

To perform an early action to remediate the PCB contaminated areas separately, Occidental prepared a Focused Feasibility Study (FFS) which analyzed alternatives to address the PCB-contaminated areas on the site. Since the PCB-contaminated areas had been defined by previous investigations, and the technologies for treatment were different from the rest of the site, it was decided to perform an early action. The PCB excavation was then designated as OU 2.

OU 2 of the site covered an area surrounding the pilot plant building and a portion of Sump 3 which was contaminated by PCBs. A ROD addressing OU 2 was issued on September 28, 1990. The ROD selected excavation followed by offsite disposal and incineration of the PCB contaminated soils.

A Unilateral Administrative Order was issued by the EPA to perform the OU 2 Remedial Design and Remedial Action (RD/RA) on June 27, 1991. Notices of Intent to Comply with the order were submitted by both Occidental and Ruco Polymer and were received by EPA on July 17, 1991.

Final approval of the RD/RA Work Plan was given by EPA in April, 1992. Mobilization for the execution of the Remedial Action of OU 2 took place on May 4, 1992. All operations of the work were monitored by an EPA oversight contractor. An EPA inspection visit was made on September 3, 1992 at which time all restoration was completed.

Occidental's Remedial Action Report was received on October 19, 1992 and EPA's final approval was issued on March 12, 1993. This concluded the activities associated with OU 2.

Upon completion of the OU 2 remedy, four areas of PCB contaminated soils surrounding the pilot plant were addressed. They were: 1) the direct spill area; 2) transport related areas; 3) the previously excavated soils; and, 4) the impacted recharge basin (Sump 3) (Figure 2). The volumes of PCB-contaminated soils that were removed, were as follows:

10 ppm - 500 ppm = 3,230 tons (1,957 cu.yds.)

500+ ppm = 85.2 tons (52 cu.yds)

A larger problem associated with this site and the adjacent sites (Grumman and the Navy), is the existence of downgradient groundwater contamination. This is the third area of concern stated above. The EPA and NYSDEC are currently coordinating activities concerning the RI/FS of the groundwater contamination that has migrated downgradient from the Ruco property boundary and the Grumman and Navy facilities. The EPA and NYSDEC have identified three sites that are currently contributing to the groundwater contamination including; the Hooker/Ruco (EPA lead), Grumman (State lead) and the Navy (State and EPA lead) sites. NYSDEC and EPA are coordinating the downgradient contamination investigation and remedial actions for the three sites to avoid duplication of efforts. The agencies are managing their sites by implementing source control measures (e.g., OU 1 and OU 2 for the Hooker/Ruco site), then addressing the downgradient groundwater contamination problem separately. A regional approach to the groundwater contamination problem is being applied. Much of the investigation field work has been completed already. It is expected that it will be approximately one year before EPA and NYSDEC select a remedy for the groundwater problem. In the interim, actions have been taken by NYSDEC and Grumman to provide protection of the public water supply. A treatment system has been installed on one of the Bethpage Water District's supply wells, and additional monitoring wells are being installed to detect contaminants as they approach other supply wells.

Other actions on the Ruco property are being initiated to address potential buried materials in the soil. The electromagnetic survey conducted during the RI indicated the presence of magnetic anomalies in the subsurface soils. The presence of such anomalies may indicate buried metallic objects such as a tank or drum. A Work Plan has been submitted by Occidental and approved by the EPA to further investigate these anomalies and remove any buried objects that may present a potential source of contamination.

Additionally, an investigation of buried materials in the soils not associated with the magnetic anomalies is expected to be conducted. This investigation between Plant 2 and the Pilot Plant, may involve the excavation of test pits or trenches. This work is expected to begin in August or September of 1993.

The two actions cited above are not being conducted as part of a specific OU. Instead, they are being treated as removal-type remedies to facilitate quick action.

REMEDIAL INVESTIGATION SUMMARY

The RI, combined with previous studies, resulted in a characterization of the environmental conditions of the Ruco property. Sampling of all media, including air, soil vapor, soils, surface water, sediment and groundwater has identified areas of potential environmental concern. The following briefly summarizes the results of the sampling conducted during the RI:

Soil Vapor: Soil-vapor sampling and analysis was performed at 80 locations throughout the site. The results of the soil-vapor analysis did not reveal any soils with volatile organic vapors, or additional areas of the plant soils requiring further environmental sampling.

Surface Water: The surface water existing in Sumps 3 and 4 contained low levels of chemicals associated with the site due to surface water runoff from the active plant areas. The presence of these chemicals is related to present activities at the site.

Sump Sediments: The sediments from Sumps 3 and 4 contained low levels of chemicals associated with past and current site activities. Sump 3 contained phthalates and PCBs, which were removed as part of the OU 2 remedy. Sump 4 sediments contained polycyclic aromatic hydrocarbons (PAH's), phthalates, and 1,2-dichloroethylene (1,2-DCE) at levels below concentrations considered protective of groundwater. These sediments also contained tentatively identified compounds or TICs. TICs are compounds that are not on EPA's Target Compound List (TCL) and are not routinely analyzed for in samples collected. Routine analysis merely identifies the presence of a compound that is not on the TCL list and attempts to name the compound through a computer library search. They are therefore designated as TICs. These sumps receive surface water runoff from active areas of the plant which can contain low levels of chemicals, as seen in the surface water. Low-level accumulation of these chemicals in the sediments is a continuing process related to current plant activity.

Shallow Soils: Soil borings were performed at approximately 50 locations across the Ruco property. The investigation identified sporadic, low-level occurrences of chemicals in the surficial soil throughout the active plant areas. Shallow soils in the former drum storage area, particularly in the area of boring number 10 (TB-10) (Figure 3), contained TICs at levels that were of some concern. Because very little or no risk information exists for these compounds, and TICs have been detected in the groundwater, the soils in this area have been included in this Proposed Plan as requiring remediation. In 1984, a soil boring performed in the area of monitoring well E (MW-E), indicated the presence of tetrachloroethylene (PCE, sometimes referred to as perchlorothlyene or "perc") at 244 ppm at the surface (Figure 4). This level is not considered to be protective of groundwater. However, since the boring was performed some time ago, additional borings will be required to confirm the presence of PCE in this area. The occurrence of PCBs in shallow soils was completely defined and was the subject of the OU 2 remedial action.

Deep Soils: The deep soils beneath Sumps 5 and 6 do not contain chemicals at concentrations significantly above the protection of groundwater criteria. However, the deep soils beneath Sump 1 contain compounds such as trichloroethylene (TCE), PCE, 1,2-DCE, phthalates and phenols at levels that could potentially continue to go into solution and enter the groundwater system. Only the soils beneath Sump 1 represent a "hot spot" or a concentrated area of elevated contaminants. The analytical information obtained during the RI did not indicate the presence of chemicals in the surficial soils of Sump 2 above levels that are considered protective of groundwater. However, to confirm the presence or absence of potential contaminants in the deep soils of Sump 2 (below 12 feet), additional sampling will be required.

Groundwater: A total of 32 monitoring wells have been installed at the site. Some of these wells were installed prior to the RI and some were installed as part of the RI. The wells are located on, or in the immediate vicinity of Ruco property and monitor the upper to middle portions of the Magothy aquifer (for more detailed information on the geology and hydrology at the Site, the Remedial Investigation Report should be referenced). Based on the sampling conducted prior to and during the RI, the evidence indicates that groundwater beneath the Ruco property, specifically in the southeast portion, contains chemical constituents above the New York State drinking water standards, NYS groundwater quality standards and EPA maximum contaminant levels (MCLs). Groundwater containing vinyl chloride monomer (VCM), PCE, DCE, TCE, TICs and arsenic, is moving with the groundwater, downgradient from the Ruco property. Available information from the RI and other investigations indicates there are regional occurrences of chloroethylenes, and that additional sources of these contaminants are present. Low levels of some of the chloroethylenes have been detected upgradient from the Ruco property.

Currently, there are no private drinking water supply wells on the Ruco property or in the residential areas surrounding the property. A Nassau County Ordinance only permits obtaining drinking water from a public supply source. Public water supply is obtained from the groundwater aquifer in the surrounding communities of Hicksville, Bethpage and Levittown. The nearest public supply wells to the Ruco property are located 2,000 feet to the north (Hicksville supply wells), 3,500 feet to the west (Hicksville supply well) and 6,000 feet to the east (Bethpage supply wells). Other public supply wells located downgradient to the site are 5,500 feet to the southwest (Hicksville and Levittown supply wells) and approximately 10,000 feet to the south (Bethpage and Levittown supply wells).

In summation, the results of the Remedial Investigation conducted at the Hooker/Ruco site indicate the past disposal practices of discharging process wastewater to the sumps has contaminated the soils and groundwater on the Ruco property. Sampling at the site indicates the presence of volatile and semi-volatile organic contaminants in the deep soils beneath Sump 1 and the surface soils in the former drum storage area above levels considered protective of groundwater quality. Two additional areas of the property have been identified as potential sources of contamination. These areas are the soils beneath Sump 2 and the surface soils near monitoring well E. Additional sampling will be required to verify the presence of contaminants in these areas and determine if concentrations are above levels protective of groundwater. If this is the case, the soils beneath Sump 2 and surface soils around well E will also be addressed by the preferred alternative.

The RI, through the sampling of groundwater monitoring wells, indicates the presence of contaminants in the groundwater. The level of these contaminants are above NYSDEC's groundwater standards and EPA's MCL's.

SUMMARY OF SITE RISK

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site if no remedial action were taken.

Human Health Risk Assessment

The reasonable maximum human exposure is evaluated. A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification*--identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment*--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed. *Toxicity Assessment*--determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization*--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks.

The baseline risk assessment began with selecting contaminants of concern which would be representative of contaminants detected at the site. These contaminants of concern were used to calculate the human health risks from exposure to the various media (i.e., groundwater, soil, sediments, etc.). The development of the risk estimates indicated that a few specific chemicals were the major contributors to the site risks. These included: PCE, vinyl chloride, antimony, arsenic, beryllium, and manganese.

Of the contaminants listed above, PCE is known to cause cancer in laboratory animals and is suspected to be a human carcinogen. The other contaminants, arsenic, beryllium, and vinyl chloride are class A carcinogens, or, are known to cause cancer in humans. The contaminants antimony and manganese were identified as the major contributors to the noncarcinogenic risks at the site.

The baseline risk assessment evaluated the health effects which could result from exposure to contamination as a result of dermal contact, ingestion, and inhalation of site soils, sediments, surface water and groundwater. The current land-use at the Ruco Property was considered to be industrial, as it is presently zoned. The future-use scenario also assumed the Ruco Polymer property would remain zoned for industrial use. However, a resident was assumed to live at the downgradient property line and use the sole source aquifer as a water supply. The exposure scenarios included on-site workers, trespassers, and residents.

EPA's current guideline for acceptable exposure is an individual lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6}. This should be interpreted to mean that an individual may have one in ten thousand (10^{-4}) to one in one million (10^{-6}) increased chance of developing cancer as a result of Site related exposure to a carcinogenic compound over a 70 year lifetime.

The results of the baseline risk assessment indicated that the current use of groundwater at the Ruco property was not a risk since no one uses the groundwater for domestic purposes. On the Ruco property, the soil pathway alone was also determined not to be a human health risk in both the current and future-use scenarios. However, the combined soil, sediment and surface water pathway for an on-site worker was estimated to be at the 10^{-4} or upper limit of the risk range. The risks associated with TICs in the shallow soils could not be quantified due to the lack of toxicity information for these compounds. The risk from TIC exposure is therefore unknown. This unknown risk, combined with the quantified risk from shallow soils was cause for potential concern at the site.

The future groundwater-use scenario was the only scenario to pose an unacceptable risk to human health. The carcinogenic risks that have been identified for the future groundwater exposure scenarios are as follows: ingestion exposures yielded a potential carcinogenic risk to adults of 2.2×10^{-3} (i.e., 2.2 additional persons out 1000 are at risk of developing cancer if the site is not remediated.), and for children a risk of 8.8×10^{-4} (i.e., 8.8 additional persons out of 10,000 are at risk of developing cancer). The inhalation exposures to adult residents in the future use scenario result in a potential carcinogenic risk of 5.0×10^{-4} (i.e., 5.0 additional persons out of 10,000 are at risk of developing cancer). Carcinogenic inhalation risks to children residing at the property line were calculated to be 1.0×10^{-4} (i.e., 1.0 additional child in 10,000 is at risk). Analysis of groundwater dermal contact exposure to residents (both adults and children) resulted in a potential carcinogenic risk to adults of 1.1×10^{-4} (i.e., 1.1 additional persons out of 10,000 are at risk of developing cancer), and to children of 1.3×10^{-5} (i.e., 1.3 additional persons out of 100,000 are at risk).

The Hazard Index, which reflects noncarcinogenic effects for a human receptor, was estimated to be 10.2 for children and 4.89 for adults in the groundwater ingestion future use scenario. A hazard index greater than 1.0 indicates that the exposure level may exceed the protective level for that particular chemical.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a potential threat to public health.

Ecological Risk Assessment

The reasonable maximum environmental exposure is evaluated. A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: *Problem Formulation*--a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. *Exposure Assessment*--a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. *Ecological Effects Assessment*--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

The ecological risk assessment began with evaluating the contaminants associated with the site in conjunction with the site-specific biological species/habitat information. The contaminants of concern at this site are not expected to significantly impact any ecological receptors (plant or animal species or habitat).

The site is fully developed as an industrial facility and is surrounded by similar types of land use. There are no natural surface water bodies or wetlands within the site vicinity. The contaminants of concern are found in the soils and groundwater which do not appear to be a habitat for any wildlife that may impact the food chain. The only observed animal life at the site were transient Canada geese, which are not expected to be part of the higher food chain, and therefore, any impacts to the geese from the site are not expected to affect the area wildlife population. The risk assessment also considered whether there were present visible signs of impairment to the geese that were attributable to the contamination found at the site. No visible signs were observed.

The results of the ecological risk assessment indicate that the contaminated soils and groundwater at the site do not pose an unacceptable ecological risk.

SCOPE AND ROLE OF ACTION

As stated above, the site has been separated into distinct remedial actions or "operable units (OUs)." The OUs for this site are divided as follows:

- o OU 1: Covers the majority of the site; soils and groundwater contamination from previous disposal activities.

- o OU 2: PCB-contaminated soils surrounding the pilot plant and in sump three.

- o A third area of concern: Contaminated groundwater, downgradient of the Ruco property boundary.

This proposed plan addresses the first OU. The EPA is proposing this action to eliminate the potential threat from the contaminated groundwater at the Ruco property and also eliminate the contribution of contaminated soils to the degradation of the sole source aquifer. The RI identified groundwater beneath the Ruco property above New York State groundwater quality standards, NYS drinking water standards and Federal MCLs. The RI has also identified limited areas of soils on the property that need to be remediated to protect the groundwater quality. Additional limited areas of soils have been identified that may potentially need to be remediated to protect groundwater quality. Therefore, OU 1 will address:

- groundwater beneath the Ruco property,

- the remediation of soils in the following areas:

1) the soils beneath Sump 1,

2) the surficial soils in the former drum storage area; and based on additional sampling,

3) the soils beneath Sump 2, and

4) the surficial soils around monitoring well E.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment.

The following remedial action objectives were established:

Groundwater

The Risk Assessment has identified a future carcinogenic and noncarcinogenic health risk to residents who may reside at the Ruco property fenceline and use the groundwater (a sole source aquifer). The contaminants in groundwater are subject to a number of regulations for cleanup and discharge. These regulations are the NYS Water Quality Regulations specifically, 6 NYCRR and 10 NYCRR as well as the Federal MCLs. The EPA selects the most stringent criteria for cleanup at superfund sites. The specific ARARs identifying the groundwater cleanup and discharge criteria are listed in the regulations cited above. These are also listed in the FS Report for this site.

Therefore, the specific Remedial Action Objectives for groundwater are the reduction of risks to human health associated with potential exposure to site related compounds by controling the migration of groundwater downgradient from the Ruco property and attaining the sole source aquifer (groundwater) cleanup criteria established by ARARs.

Deep and Shallow Soils

For the soils, no risks were associated with direct exposure to the contaminants remaining at the site. However, contaminant concentrations in the soils of the former drum storage area, Sump 1 and possibly the area around monitoring wells E and Sump 2 at the site are, or are suspected to be, above levels that would be protective of the groundwater quality. This means that contaminants in the soil could leach into the groundwater at levels above the groundwater ARARs. The NYSDEC has developed soil cleanup criteria that is considered protective of groundwater quality. This criteria, established in NYSDEC's Technical and Administrative Guidance Memorandum (TAGM), will be used as a to-be-considered (TBC) goal in cleaning up soils at the site. The TBC values are not promulgated regulations and therefore, are not considered ARARs. As TBCs, they are not enforceable standards but may be used as one of the criteria in determining whether the remedial action objectives have been met. The EPA has also identified the shallow (0' to 5') soils in the former drum storage area as a potential hazard that would require remediation. These soils, particularly the area around soil boring TB-10, displayed high concentrations of TICs. The risk to site workers and others from these TICs is unknown, however, the combined risk of the TICs with the quantified soils risk identified in the Risk Assessment necessitates remedial action.

Therefore, the Remedial Action Objectives for soils at the site are the protection of the sole source aquifer (groundwater quality, and ultimately human health as well as limiting exposure to surficial soil contaminants.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other measures considered, may present a potential threat to the public's health.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The FS report evaluates in detail four groundwater alternatives, four deep soil alternatives and three shallow soil remedial alternatives for addressing the contamination associated with the Hooker Chemical/Ruco Polymer site.

These alternatives are media specific, meaning a set of alternatives to address the groundwater contamination and a set of alternatives to address the soils contamination has been developed separately. These alternatives are summarized in this section.

GROUNDWATER

The remedial alternatives to address the groundwater medium are as follows:

Groundwater Alternative 1: No Action

Capital Cost: $ 0
O & M Cost: $ 0
Present Worth Cost: $ 0
Construction Time: None

(Construction time refers to the time required to physically construct the remedial alternative. This does not include the time required to negotiate with the responsible parties for the remedial design and remedial action, or design the remedy.)

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. This alternative has been included in order to provide a datum from which to evaluate the other alternatives. The no action alternative assumes no additional actions will be taken at the Hooker/Ruco site to address groundwater contamination. Contaminated groundwater beneath the Ruco property would continue to move uncontrolled downgradient. Contaminated soils at the site would not be addressed by this alternative either. This would allow contaminants to contribute to the degradation of the groundwater quality by leaching from the soils. No institutional controls would be implemented which would provide no control of groundwater use in the area or well restrictions. This alternative would not treat any quantity of the contaminated groundwater, requires no engineering components, treatment components, and has no costs associated with its implementation.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Groundwater Alternative 2: Deed Notations with Monitoring

Capital Cost: $ 39,000
O & M Cost: $ 37,000/year
Present Worth Cost:
- 10-year - $ 325,000
- 30-year - $ 608,000.

Construction Time: Less than one year.

Alternative 2 invloves the use of institutional controls by obtaining deed notations to limit the land use activities at the Ruco property, well permitting to restrict groundwater use and groundwater monitoring. Deed notations would be required to limit the development of the property to industrial uses only. Deed notations would also be focused on preventing the drilling of wells at the site or requiring treatment if wells were drilled. This would provide some degree of control on the groundwater use and well construction activities and control development of the Ruco property. Annual sampling of the existing monitoring wells on the Ruco property would provide an assessment of the groundwater contaminant concentrations and mobility. Annual status reports would be filed with the appropriate regulatory agencies. Implementation of these institutional controls would require the cooperation of Ruco Polymer Corporation to file the deed restrictions and the enforcement of these restrictions by the appropriate regulatory agencies. Controls for water use and well construction restrictions are currently in place in the form of a permit and approval process, Article IV of the Nassau County Public Health Ordinance, at the county level. Monitoring the status of the impacted groundwater by collection and analysis of samples is a standard technology that is easily implementable. This alternative does not involve the treatment of any portion of the contaminated groundwater or soils. Therefore, no engineering or treatment components are part of this alternative. Capital costs consist of legal fees for obtaining the deed notations and well permitting, while the O&M costs consist of annual monitoring costs.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Groundwater Alternative 3: Groundwater Extraction and Treatment with Discharge to an On-Site Recharge Basin

Capital Cost: $ 4,748,000
O & M Cost: $ 549,000/year

Present Worth Cost:
- 10-year - $ 8,986,000
- 30-year - $ 13,185,000.

Construction Time: Less than one year.

Under this alternative, groundwater would be pumped from extraction (recovery) wells, and piped to a treatment system utilizing applicable technologies. The exact number of extraction wells and quantity of water to be pumped would be determined in the design phase. For the purposes of the FS, three 8 inch diameter extraction wells, at depths of 125 feet below grade (bg), screened from 40 feet bg to the bottom and were estimated to pump at a combined flow rate of 100 gpm. This conceptual design was used in the development of the groundwater extraction alternatives. The optimum technology or technologies to treat the pumped groundwater would also be determined during the design phase. However, for the purpose of evaluating this potential remedy, the FS Report was required to make some reasonable assumptions. These assumptions were based on groundwater modeling, current knowledge of existing waste treatment practices, availability, and standard engineering principles. At 100 gpm, this alternative would treat approximately 53,000,000 gallons of groundwater per year. The effluent from the groundwater treatment process would be discharged to Sump 3 on the Ruco property. Deed restrictions and monitoring would be applied as described in Alternative 2 above. The O&M would include electric power, servicing of pumps and motors, periodic well development, treatment system operation and annual monitoring.

The effectiveness of the proposed extraction wells was evaluated using the computer model described in Appendix B of the FS Report. According to the conceptual model, the recovery wells will prevent the downgradient migration of impacted groundwater.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Groundwater Alternative 4: Groundwater Extraction and Treatment with Discharge to Leaching Galleries

Capital Cost: $ 4,867,000
O & M Cost: $ 549,000/year
Present Worth Cost:
- 10-year - $ 9,105,000
- 30-year - $ 13,304,000

Construction Time: Less than one year.

The extraction and treatment of groundwater in this alternative is the same as described in Alternative 3 above. The only difference between Alternative 3 and this alternative would be the point of discharge for the treated groundwater. Under this alternative the treated groundwater would be discharged to leaching galleries on the Ruco property. The proposed leaching gallery area would be approximately 75 by 75 feet, and would be completed to a depth of 5 feet bg.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

<u>DEEP SOILS</u>

The FS also examined alternatives to address the deep and shallow soil contaminants remaining at the site that would be potentially contributing to the degradation of the groundwater quality. All of the alternatives to address the soils in Sump 1, with the exception of the no action alternative, would require the existing concrete storage tanks to be removed. Prior to removal, the tanks would be cleaned and then subjected to Waste Characterization tests prior to disposal in a RCRA regulated subtitle C landfill if necessary, or a subtitle D landfill. The alternatives to address the deeper soils also include two scenarios based on the results of additional soil sampling to be conducted in the pre-design phase of OU 1. The alternatives present the costs for Sump 1 alone and the costs for Sump 1 and Sump 2 based on the soil sampling results.

The alternatives for the deep soils are as follows:

Deep Soil Alternative 1: No Action

Capital Cost: $ 0
O & M Cost: $ 0/yr
Present Worth Cost: $ 0
Construction Time: This alternative does not require construction.

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. The no action alternative requires no changes to be made to the existing site conditions. Therefore, there would be no technical, engineering or treatment components of this alternative. The TBC criteria (soil cleanup values that would protect groundwater), would not be achieved by implementing this alternative. Precipitation would continue to infiltrate the soils and most likely flush the soluble contaminants into the groundwater.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Deep Soil Alternative 2: Capping of Sump 1 (and Possibly Sump 2)

Capital Cost:
Sump 1 alone - $ 213,000,
Sump 1 and Sump 2 - $ 345,000
O & M Cost:
Sump 1 - $ 5,000/yr,
Sump 1 and Sump 2 - $ 7,000/yr
Present Worth Cost:
Sump 1 : 10-year - $ 251,000
30-year - $ 289,000
For Sump 1 and Sump 2: 10-year - $ 396,000
30-year - $ 446,000.
Construction Time: Two to three months.

This alternative involves installing a cap over the potential soil remediation area, Sump 1, in accordance the RCRA performance specifications. The proposed cap would occupy an area of approximately 13,500 square feet. Based on the results of additional post-ROD soil borings in Sump 2, the area of the proposed cap would be extended. If contaminants are found to be present in Sump 2 above the protection of groundwater criteria, Sump 2 would also require capping. This would require the size of the proposed cap to be approximately 20,500 square feet. The associated costs of the extended cap would also increase as have been indicated above. The proposed cap would consist of the following layers above the existing soil: a geosynthetic clay liner (comprised of geotextile outer layers with an inner layer of low permeability sodium bentonite), a 60-mil high-density polyethylene (HDPE) geomembrane liner, 6 inches of gravel acting as a drainage layer, a 20-mil filter fabric, 12 inches of gravel subbase and 6 inches of asphalt.

The cap would provide for the protection of groundwater quality by removing the exposure of the contaminants in the soils to the infiltration of precipitation. The downward movement of water through the soils (percolation) would not occur with the cap in place. Leaching of contaminants from the soil into the groundwater would be eliminated. Capping would not reduce the concentration of the compounds in the soils, but would reduce their mobility. The TBC criteria for soils would not be met, however, groundwater quality would be protected by removing the migration pathway to the groundwater.

The installation of a cap would require a moderate design effort followed by approximately two to three months of construction and moderate effort in reporting and documentation. Periodic inspections to ensure the integrity of the cap would be required as part of the O&M.

Because this alternative would result in contaminants remaining on-site above health based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Deep Soil Alternative 3: Soil Vapor Extraction and Capping

Capital Cost:
Sump 1 - $ 332,000,
Sump 1 and Sump 2 - $ 515,000
O & M Cost:
Sump 1 - $ 48,000/yr,
Sump 1 and Sump 2 - $ 56,000
Present Worth Cost:
Sump 1: 10-year - $ 703,000
30-year - $ 1,070,000
Sump 1 and Sump 2: 10-year - $ 948,000
30-year - $ 1,378,000
Construction Time: Less than one year.

Alternative 3 for the deep soils is the same as Alternative 2 above, with the addition of the soil vapor extraction (SVE) system. This alternative involves the installation of soil vapor extraction wells in Sump 1 (and possibly Sump 2, based on subsequent soil sampling) and treating the collected vapor prior to discharge to the atmosphere. Air inlet wells would be installed at the cap perimeter to enhance the availability of air to the soils and the vapor removal. The SVE and air inlet wells would be drilled to an approximate depth of 50 feet bg, be approximately 4 inches in diameter, and be screened from 20 feet below ground (bg) to the bottom. The SVE piping would be installed beneath the cap (described in Alternative 2). The SVE wells would be joined by a common header pipe located in the treatment shed. This pipe would be connected to a vapor phase separator (demister) where moisture would be removed from the air stream. The demister would be connected to a positive displacement blower, which provides a negative vapor pressure gradient to the subsurface soil. For the purposes of the FS, it was conservatively assumed that the discharge from the blower would undergo treatment using vapor-phase carbon prior to being vented to the atmosphere. The cap would act as a seal to prevent air from entering near the extraction wells (where the pressure gradient is greatest) and would promote a radial horizontal subsurface air flow. A radial flow forces air to be drawn over a greater distance, thereby contacting a greater volume of soil. The actual system parameters would be determined in the remedial design phase.

SVE has been a proven technology for soils impacted by volatile organic carbon (VOC) contaminants. This process has been employed at many sites at both small and large-scale field applications. The effectiveness of SVE is highly dependent upon the volatility of a particular contaminant. SVE would be effective for treating PCE, TCE and 1,2-DCE but not for phenol, di-n-butyl phthalate and TICs. It is expected then, that the TBC criteria (protection of groundwater) would be achieved for some of the contaminants, but not for others as indicated above. The SVE system would be required to meet the substantive requirements for air emission discharge criteria which are considered an ARAR. Because the soil in the potential remediation area consists of medium to coarse sand and fine to coarse gravel, SVE is well suited for the geologic conditions at the site. The necessary equipment is readily available and the process is easily implemented.

Because this alternative may result in contaminants remaining on-site above health-based, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Deep Soil Alternative 4: Soil Flushing

Capital Cost:
Sump 1 - $ 16,000,
Sump 1 and Sump 2 - $ 25,000
O & M Cost:
Sump 1 - $ 1,000/yr,
Sump 1 and Sump 2 - $ 3,000
Present Worth Cost:
Sump 1: 10-year - $ 26,000
30-year - $ 37,000
Sump 1 and Sump 2: 10-year - $ 45,000
30-year - $ 65,000.
Construction Time: Less than one year.

This alternative would consist of flushing the contaminants from the soils in Sump 1, and possibly Sump 2, by the deliberate discharge of water to the sumps. The discharged water would then percolate down through the contaminated soil and flush the soluble contaminants. The contaminant compounds, now dissolved in the water, could be recovered through the use of extraction wells.
This alternative requires the use of a groundwater or vadose zone recovery system which could be either a separate extraction system design for the soils only, or, in this case, as part of the extraction and treatment system described in the alternatives to treat the groundwater.
This type of system would essentially be an injection and recirculation process. In this case, treated groundwater from the groundwater extraction and treatment system would be discharged primarily to a sump to be constructed in the northwest portion of the site, with a portion of the discharge to be diverted to Sump 1. Sump 2 would also be included if the results of subsequent soil borings indicate the presence of soils contamination in excess of the soil cleanup criteria that is considered protective of groundwater. The conceptual model developed in the FS, for the purposes of evaluating this alternative, estimated that a total of approximately 10 gpm could be discharged to Sump 1 and Sump 2 without overloading the groundwater recovery system. In comparison with the estimated rate of extraction (100 gpm), the rate of recharge to Sumps 1 and 2 is 10 gpm or about 10 % of the extraction rate. Discharge to the sump(s) would be distributed over the sump(s) areas through piping networks. The discharged water, after percolation through the sump soils, would be recovered by the groundwater extraction wells. The exact type of discharge system, placement of the extraction wells and rates of discharge and extraction would be determined during the design process.

This alternative would be effective for those contaminants that are relatively soluble, or likely to dissolve in water. The contaminants that are most soluble, such as the VOCs (e.g., TCE, PCE, VCM, phenol, 1,2-DCE and, based on preliminary information, the TICs) would be readily dissolved and flushed from the soil. These compounds have all been observed in the groundwater beneath the site. The more insoluble compounds, such as the phthalates, would not dissolve as easily, or in some cases, not at all. These insoluble compounds tend to adsorb onto small soil particles and be persistent in the soil. The soil flushing alternative for these compounds would be less effective. However, the flushing of the soil would recover some of these adsorbed contaminants through the movement and capture of these small soil particles. Any contaminants that could not be dissolved, or particles that could not be mobilized through the soil flushing would not be expected to enter the groundwater system in sufficient quantity to degrade the future groundwater quality.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

SHALLOW SOILS

The alternatives identified in the FS to address the shallow soils also examined two potential scenarios. The first scenario would involve addressing the soils in the former drum storage area only. The second scenario would include the soils around monitoring well E as well as the former drum storage area based on the results of pre-design soil sampling.

The alternatives to address the shallow soils are:

Shallow Soil Alternative 1: No Action

Capital Cost: $ 0
O & M Cost: $ 0/yr
Present Worth Cost:

- 10-year - $ 0
- 30-year - $ 0

Construction Time: None

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. The no action alternative requires no changes to be made to the existing site conditions. Therefore, there would be no technical, engineering or treatment components of this alternative. The TBC criteria (soil cleanup values that would protect groundwater), would not be achieved by implementing this alternative. Precipitation would continue to infiltrate the soils and most likely flush the soluble contaminants into the deeper soils and eventually into the groundwater. Workers at the Ruco Polymer site would potentially be exposed to contaminants in the surficial soils.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Shallow Soil Alternative 2: Capping

Capital Cost:
Former Drum Storage Area Only - $ 86,000,
Drum Storage Area plus Well E Area - $ 95,000
O & M Cost:
Drum Storage Area - $ 3,000/yr,
Drum Storage Area plus Well E Area - $ 3,000/yr
Present Worth Cost:
Former Drum Storage Area: 10-year - $ 107,000
30-year - $ 128,000
Former Drum Storage Area plus the Well E Area:
10-year - $ 121,000
30-year - $ 146,000
Construction Time: Two to three months.

This alternative involves installing a cap over the potential soil remediation area, the former drum storage area, in accordance with RCRA performance specifications. The proposed cap would occupy an area of approximately 3,850 square feet. Based on the results of additional post-ROD soil borings to be performed in the area near monitoring well E, a cap may be required. If contaminants are found to be present in the surficial soils around monitoring well E above the protection of groundwater criteria, this area would also require capping. Additional soil sampling may be required to delineate the extent of the cap. This would require an additional area to be capped of approximately 1,160 square feet. The proposed cap would consist of the following layers above the existing soil: a geosynthetic clay liner (comprised of geotextile outer layers with an inner layer of low permeability sodium bentonite), a 60-mil high-density polyethylene (HDPE) geomembrane liner, 6 inches of gravel acting as a drainage layer, a 20-mil filter fabric, 12 inches of gravel subbase and 6 inches of asphalt.

The cap would provide for the protection of groundwater quality by removing the exposure of the contaminants in the soils to precipitation. The downward movement of water through the soils (percolation) would not occur with the cap in place. Leaching of contaminants from the soil into the groundwater would be eliminated. The cap would also eliminate any potential exposure of site workers to surficial soil contaminants. Capping would not reduce the concentration of the compounds in the soils, but would reduce their mobility. The TBC criteria for soils would not be met, however, groundwater quality would be protected by removing the migration pathway to the groundwater.

The installation of a cap would require a moderate design effort followed by approximately two to three months of construction and moderate effort in reporting and documentation. Periodic inspections to ensure the integrity of the cap would be required as part of the O&M.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Shallow Soil Alternative 3: Excavation and Off-Site Disposal in a Chemical Waste Landfill

Capital Cost:
Former Drum Storage Area only - $ 482,000,
Former Drum Storage Area plus Monitoring Well E Area - $ 758,000
O & M Cost: There are no O&M costs associated with excavation and off-site disposal
Present Worth Cost:
Former Drum Storage Area: 10-year and 30-year present worth costs are $482,000. This represents the one-time investment of the capital costs.
Former Drum Storage Area plus Monitoring Well E Area: 10-year and 30-year - $ 758,000
Construction Time: Less than one year.

This alternative would require the excavation of the surficial soils in the former drum storage area, specifically the area around TB-10. The proposed excavation would remove an estimated total soil volume of 445 cubic yards from the former drum storage area. Based on the results of additional post-ROD soil borings in the area near monitoring well E, an additional area of excavation would be required. If contaminants are found to be present in the area around monitoring well E above the protection of groundwater criteria, this area would also require excavation. This would increase in the total volume of the soil to be excavated by approximately 265 cubic yards. Additional soil sampling may be required to delineate the extent of the soils to be removed.

The excavated soil would then be tested to determine if it could be classified as a characteristic hazardous waste. If the soils were determined to be a characteristic hazardous waste, the RCRA Land Ban restrictions would be an ARAR. This would mean the soils would require treatment before disposal.

This alternative would be effective in permanently removing the contaminants from the site, thereby eliminating the potential for the contaminants to migrate to the groundwater and removing any risks associated with direct contact with the soils. Excavation is easily implemented through the use of standard construction equipment and would require one or two months of field work to complete. No O&M requirements are involved with the excavation of the shallow soil alternative.

This alternative would result in the complete removal of contaminants in the shallow soils identified as the former drum storage area and the area around monitoring well E, therefore, the site would not require a five year review.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- o <u>Overall protection of human health and the environment</u> addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- o <u>Compliance with applicable or relevant and appropriate requirements (ARARs)</u> addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- o <u>Long-term effectiveness and permanence</u> refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

- o <u>Reduction of toxicity, mobility, or volume through treatment</u> is the anticipated performance of the treatment technologies a remedy may employ.

- o <u>Short-term effectiveness</u> addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- o <u>Implementability</u> is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- o <u>Cost</u> includes estimated capital and operation and maintenance costs, and net present worth costs.

- o <u>State acceptance</u> indicates whether, based on its review of the RI/FS reports and Proposed Plan, the state concurs, opposes, or has no comment on the preferred alternative at the present time.

- o <u>Community acceptance</u> will be assessed in the Record of Decision (ROD) following a review of the public comments received on the RI/FS reports and the Proposed Plan.

A comparative analysis of these alternatives based upon the evaluation criteria noted above.

- o <u>Overall Protection of Human Health and the Environment</u>

Groundwater Alternatives

Alternative 1, no action, would not provide for the protection of human health for the future potential residential use of the area at the Ruco Polymer downgradient fenceline. Contaminated groundwater would continue to migrate downgradient degrading the aquifer. Exposure to the contaminants in the groundwater would present an unacceptable health risk to the users. Alternative 2, Deed Notations with Monitoring, would provide some level of protection to the Ruco property owners by restricting groundwater uses at the site. However, future risks to the public would still remain as described in Alternative 1, above. Alternatives 3 and 4 would provide adequate protection to potential downgradient residents by controlling the migration of groundwater contaminants. Groundwater beneath the Ruco property would be captured and treated before downgradient receptors could be exposed. Groundwater pump and treat also has the potential to prevent further degradation to a sole source aquifer and restore the aquifer to its beneficial use.

Deep Soils

The no action alternative (Alternative 1) would not provide protection of human health because the contaminants in the soil would continue to leach into the groundwater and therefore degrade the groundwater quality. The potential for exposure through the groundwater migration pathway would then present a human health risk. Alternatives 2, 3 and 4 all offer protection by either limiting the mobility of the contaminants, as is the case with capping, or by removing and capturing the contaminants through SVE or soil flushing. This would eliminate the potential contribution of the contaminants in these areas to the degradation of the groundwater (sole source aquifer) quality.

Shallow Soils

The no action alternative for the shallow soils would most likely not be protective of human health due to the existence of a potential exposure pathway. While this exposure pathway is somewhat limited (to workers at the Ruco plant) and unquantifiable (risk information for the TICs does not exist), the potential for exposure still exists. More importantly, the contaminants in these areas present a potential source of future groundwater contamination. The resultant groundwater contamination would then present potential human health risks. Alternative 2, capping, would provide the necessary level of protection to the groundwater and human health by eliminating the potential migration and exposure pathways. Alternative 3, excavation would also provide protection by removing the contaminants from the site.

o <u>Compliance with ARARs</u>

Groundwater

Alternatives 1 and 2 would not meet the chemical-specific ARARs that have been identified for this site, namely the NYS Groundwater Quality Criteria and Federal MCLs. Contaminants in the groundwater would remain in the aquifer at levels above established ARARs. Alternatives 3 and 4 would be expected to achieve the groundwater chemical-specific ARARs through the application of extraction and treatment. The extraction and treatment of the groundwater would, of course, require the discharge of the treated water on the Ruco property. The appropriate discharge standards, identified in Table 3.2 of the FS Report, would be expected to be achieved through the treatment process. The substantive requirements of any State Pollutant Discharge Elimination System (SPDES) permit, which are chemical-specific ARARs, would be met for these alternatives. If the treatment of groundwater should require the application of air stripping technology, the appropriate air emissions ARARs, National Ambient Air Quality Standards (NAAQS) and New Yorks State regulations 6NYCRR would be met. TBC criteria for air emissions, NYS Draft Guidelines for Air Emissions and EPAs Air Stripper Directive, would also be used to regulate the air emissions at the site.

There are no action-specific or location-specific ARARs identified for the groundwater alternatives.

Deep Soils

There are currently no promulgated standards for contaminant levels in soils. For this site, EPA is instead using the soil cleanup values developed by NYSDEC that are considered protective of groundwater quality as a TBC criteria for organic chemicals in soil. The TBC values, as discussed above, are taken from NYSDEC's TAGM.

Alternative 1, no action, would not meet the TBC soil criteria. Contaminants in the soil would not be treated or contained in any manner, resulting in continued leaching into the groundwater system. Alternative 2, capping, would not meet the TBC criteria either. However, the mobility of the contaminants would be reduced by eliminating the exposure to infiltrating precipitation. Alternatives 3 and 4 would not be expected to achieve the TBC criteria for all the contaminants in the soil. Some of the compounds would be remediated to the TBC levels. Contaminants with low solubility would not be removed by flushing while contaminants with low volatility would not be removed by SVE. Based on the chemical characteristics of the compounds at the site (more soluble compounds than volatile compounds), the soil flushing alternative would have more potential to achieve the TBC criteria than SVE.

Shallow Soils

Alternatives 1 and 2 would not meet the TBC soil criteria as the contaminants would remain in the soil. Alternative 2, however, would reduce the mobility of the contaminants by eliminating the exposure to precipitation. Alternative 3, excavation, would meet the TBC criteria by removing the contaminated soil from the site.

o <u>Long-Term Effectiveness and Permanence</u>

Groundwater

Alternative 1 would not be effective or permanent in providing protection to public health over the long-term. Contaminated groundwater would continue to migrate from the site posing a risk to potential receptors. Alternative 2 would provide some degree of effectiveness by limiting the potential groundwater exposure pathway through institutional restrictions. However, the ability to enforce such restrictions over the long-term is considered unreliable. Therefore, the permanence of this alternative is questionable. EPA's policy is not to rely on the use of institutional controls alone to address contamination at a site. Monitoring would be required to track the presence and concentration of contaminants in groundwater entering and leaving the Ruco property. Contaminants would remain in the groundwater posing a potential risk to a receptor. Alternatives 3 and 4 would be expected to be effective in providing protection to human health by controlling the migration of contaminants in the groundwater. Permanence of protection would be achieved by removal of the contaminants from the groundwater through treatment. These alternatives have the potential to restore the groundwater to usable quality or, at a minimum, clean up the aquifer under the Ruco property to upgradient contaminant levels. The ability of the treatment system to meet the remedial action objectives has not yet been proven. However, based on current knowledge of remedial technologies, it is expected that a treatment system can be designed to achieve the necessary performance specifications. Operation and maintenance of the extraction and treatment system would be required including the servicing of pumps and motors, periodic well development and treatment operation. The extraction and treatment system would be monitored to measure its performance. A five-year review would also be required to evaluate the effectiveness of these alternatives.

Deep Soils

While the deep soils at the site have not been identified as a direct risk to human health or the environment, they are evaluated here for their potential to be a continuing source of contamination to the groundwater.

Alternative 1 would not provide any long-term effectiveness or permanence. Contaminants in the soil would continue to enter the groundwater system and pose a risk to potential receptors. Alternative 2 would reduce contaminant mobility and, therefore, be effective in preventing the migration of contaminants into the groundwater. The effectiveness of capping for contaminants in the deeper soils near the groundwater table and capillary fringe contains a degree of uncertainty. It is possible that the seasonal fluctuations (rise and fall) in the groundwater table, or the lateral migration of infiltrating precipitation, could potentially flush contaminants from the soil and into the groundwater system. The installation of a cap would require operation and maintenance to insure the integrity of the cap. A five-year review would also be required since contaminants would remain on the Ruco property.
Alternative 3, SVE, would provide long-term effectiveness for some of the compounds by permanently removing them from the soil. However, other contaminants at the site are not effectively removed by SVE due to their low volatility. These remaining contaminants may possess solubilities that would allow them to be transported into the groundwater. Following the application of the SVE, capping of the sumps would be expected to reduce or eliminate the mobility of the remaining contaminants. A degree of uncertainty exists for the effectiveness of capping as discussed for Alternative 2, above. O&M would be required to operate the SVE system and maintain the cap. Periodic monitoring would be required to evaluate the performance of the SVE. A five-year review would be required to determine the alternative's effectiveness in protecting the groundwater quality. Alternative 4 would be expected to be effective in the long-term by removing the contaminant compounds that are most soluble and therefore, most likely be transported into the groundwater. By capturing the contaminants once they have been flushed out of the soil, they are permanently removed from the site through treatment. Any remaining contaminants would not be expected to leach from the soils due to their low solubility. This alternative would require the O&M of the recharge system extraction systems. Periodic monitoring would be involved to check the functioning of the systems. A five-year review would be required to evaluate the effectiveness of the soil flushing and determine if further steps would be required to protect the groundwater quality.

Shallow Soils

No action, Alternative 1, would not provide long-term effectiveness or permanent protection of the groundwater quality. Soluble contaminants would be able to be leached into the groundwater system by exposure to precipitation. Alternative 2 would be effective in addressing the surficial soils by eliminating the mobility of the contaminants and thus, their ability to enter the groundwater system. This is expected to be effective in the long-term provided the cap is maintained permanently. The maintenance of any structure permanently has inherent uncertainties such as the ability to enforce and regulate. O&M would require the maintenance of the cap's structural integrity. Alternative 3 would yield long-term effectiveness and permanence through the removal of the contaminants from the site. Disposal of the soil in an off-site landfill would be required. No O&M or five-year review would be involved with the excavation alternative.

o <u>Reduction in Toxicity, Mobility, or Volume</u>

Groundwater

Alternatives 1 and 2 do not reduce the toxicity, mobility or volume of contaminants present in the groundwater. The movement of contaminated groundwater would be unrestricted allowing downgradient migration and the existence of a potential exposure pathway. Such an exposure pathway would create an unacceptable risk to human health. Also, these alternatives do not satisfy the statutory preference for treatment that reduces toxicity, mobility or volume as a principal element. Alternatives 3 and 4 would both reduce the mobility of the contaminants by controlling the movement of the groundwater beneath the Ruco property through a pumping system. (The conceptual design developed in the FS estimated that a minimum of 100 gal/min would be required to prevent the migration of contaminated groundwater beneath the Ruco Property. At 100 gal/min, the pump and treat alternatives would treat approximately 53,000,000 gal/year) Migration of the contaminants in the groundwater to downgradient potential receptors would be eliminated. The extraction and treatment of the groundwater would also reduce the volume of the contaminants present in the groundwater system. The volume and toxicity of the actual contaminant compounds may or may not be reduced depending of the type of technology employed by the treatment system. A technology such as UV oxidation would physically destroy some of the contaminant compounds resulting in a reduction of volume and toxicity, while a technology such as GAC would merely filter and collect the contaminants. The exact type of technology to be used in the treatment system would be determined in the design phase through the use of treatability studies. The primary objective of Alternatives 3 and 4 would be to reduce the mobility of the contaminants. This would address the primary objective of preventing further contribution to downgradient groundwater contamination and eliminate the exposure pathway to potential receptors. These alternatives also have the potential to restore the groundwater (a sole source aquifer) to a usable quality through extraction and treatment.

Deep Soils

Alternative 1 would not result in the reduction of the toxicity, mobility or volume of the contaminants present at the site. If no action were taken at the site, contaminants in the sump(s) would continue to leach into the groundwater resulting in greater mobility. While the contaminant concentrations would decrease in the soil the resultant volume of contaminated material would also increase as contaminants spread through the groundwater. Alternative 2 would not decrease the toxicity or volume of the contaminant compounds in the soil because treatment would not be employed, but would reduce the mobility of most contaminants in the soil. Capping would prevent the infiltration of precipitation and the resultant leaching of compounds into the groundwater. This would meet the primary objective of protecting groundwater quality. Alternatives 3 and 4 would initially increase the mobility of some of the contaminant compounds in the process of extracting them. In the process of recovering and treating the contaminants, these alternatives would reduce contaminant mobility and volume of the contaminated media. Alternative 3 would increase the mobility of compounds with a higher volatility through vaporization, then capture the contaminants through vacuum extraction. If necessary, the vapor would be treated through GAC which would not reduce the actual contaminant compound volume. As part of Alternative 3, a cap would be installed to enhance the operation of the SVE system. This would also reduce the mobility of any contaminants remaining in the soil after completion of the SVE operation. Alternative 4 would also increase the mobility of the more soluble compounds initially so that they may be recovered through extraction of groundwater. The extraction and treatment of the water flushed through the soil would reduce the volume of contaminated soil. The volume and toxicity of contaminant compounds may also be reduced depending on the type of treatment technologies selected in the remedial design (see Groundwater Alternatives above). Alternatives involving the generation of treatment residuals would require that the generated material be disposed of in an appropriate off-site disposal facility. This would be determined by conducting a Toxicity Characteristic Leaching Procedure (TCLP) test on the residuals. Both Alternatives 3 and 4 would meet the primary criteria of protecting groundwater quality.

Shallow Soils

Alternative 1 would not reduce contaminant toxicity, mobility or volume. Contaminant compounds would remain in the soils and act as potential sources to groundwater contamination and contribute an unknown, unquantifiable risk to site workers. Alternative 2, without treatment, would reduce only the mobility of the contaminants by eliminating their exposure to the elements. This would require the construction of a cap to cover an area of approximately 3,850 square feet for the former drum storage area and 1,160 square feet for the well E Area. The volume of contaminated media and volume of the contaminant compounds would remain the same. The toxicity of the compounds in the soil would also remain unchanged. Although Alternative 2 would not reduce the volume or toxicity of contaminant compounds, the emplacement of a cap would achieve the primary objective of protecting groundwater quality and eliminate a potential exposure pathway as well. Alternative 3 would reduce the mobility of the contaminant compounds in the shallow soils at the site by excavating the soils and disposing of them off-site. The toxicity and volume of the contaminant compounds **at the site** would be reduced by off-site disposal. The relative toxicity and volume of the contaminants **in the soil** to be disposed of would not change. Excavation would remove the contaminated soil from the site, but, would not reduce the actual levels of contaminant compounds in the soil being disposed of. Before disposal the soil would have to be tested to determine if it qualifies as a hazardous waste. If it is not a hazardous waste, it would not be subject to the Land Disposal Restrictions (LDRs). If it was determined to be a hazardous waste, treatment would be required pior to off-site disposal. Alternative 3 would also result in achieving the primary objective of protecting the groundwater quality.

o <u>Short-Term Effectiveness</u>

Groundwater

No immediate risks to human health have been identified through exposure of contaminated groundwater beneath the Ruco property because there is currently no use of the groundwater beneath the Ruco property. Therefore, all of the groundwater alternatives should be effective in protecting human health and the environment in the short-term (until construction is complete). For Alternatives 3 and 4, no short term risks to the public are expected to be created by constructing the groundwater extraction and treatment systems. The operation of the extraction and treatment systems is expected to be a long-term activity which is not anticipated to present a risk to the public. Depending on exactly what technologies are selected for the treatment system, wastes may be generated that have to be treated (e.g., vapors from air stripping) or disposed or disposed of off-site (e.g., sludge from filtering processes). The generation of vapors would be regulated and controlled through the application of vapor control technology such as a carbon absorption unit. The off-site disposal of generated wastes would not create a significant increase in the vehicular traffic in the area as only small quantities would be generated. These activities would be conducted in a manner that would not present a risk to the public.

Deep Soils

Alternatives 1, no action, would not present any risk due to the fact that the contaminants are present at depth which leaves no opportunity for short-term exposure. Alternatives 2 and 4 are not expected to present any short-term risks through the construction and implementation of the remedies. Alternative 2 may involve a slight increase in truck traffic in the area to transport in materials to construct the cap. This impact is expected to be minimal as the area is industrial and truck traffic is a routine occurrence. Alternative 3 would not present any risks during construction, however, the operation of the SVE system would generate volatile organic vapors by extracting them from the soil. These vapors, depending on their concentration, may require treatment in the form of carbon adsorption or a burn unit to destroy the vapors. The SVE system is not expected to present a risk when properly monitored and operated.

Shallow Soils

Alternatives 1 and 2 are not expected to create any short-term hazards or risks through their implementation. As discussed above, capping may slightly increase the truck traffic at the site though this would not be a significant problem. Alternative 3 may present some low level, short-term risks through the excavation activities. Excavation would create the potential for the generation of fugitive dust emissions. However, such emissions could be controlled through simple dust suppression techniques. Off-site transport of excavated materials may also present a potential risk to residents along the transport route, although such a risk would not be considered large.

o <u>Implementability</u>

Groundwater

The no action alternative, Alternative 1, would not involve construction or the use of technologies of any kind. No modifications to the site would be required to be made. Therefore, this alternative would be easily implemented. However, the downgradient migration of contaminants in the groundwater would continue to occur, creating a potential risk to receptors.

Alternative 2 is similar to Alternative 1 as no construction would be required. Alternative 2 would require the development and implementation of deed notations and well permitting restrictions (i.e., institutional controls), in conjunction with a groundwater monitoring program. Monitoring the status of the areal extent of impacted groundwater by collection and analysis of groundwater samples is a standard technology that is easily implementable. Monitoring could be conducted through a series of existing wells. The implementation of institutional controls would not be as easy or reliable as the monitoring aspect of this alternative. Currently, the use of private supply wells for the purposes of drinking water supply, is regulated through Article IV, Nassau County Public Health Ordinance, Private Drinking Systems. Further institutional controls to restrict the construction of water wells on the Ruco property would be required to assure no exposure to contaminated groundwater would occur. This would require the development and implementation of some sort of well permitting and approval process controlled by the NYSDEC or Nassau County. Additional institutional controls would require obtaining deed notations to limit the land use activities at the Ruco property. Obtaining the deed restrictions would require the cooperation and consent of Ruco Polymer Corporation. Historically, the enforcement of institutional controls is considered unreliable. While Alternative 2 would be easy to implement technically, the administrative requirements would not be as easily achieved.

Alternatives 3 and 4 involve the extraction and treatment of groundwater. This type of technology has been applied at a variety of sites with mixed results. From a geologic and hydrologic viewpoint, the groundwater aquifer under Long Island would be the optimum type of aquifer in which to operate a pump and treat system with a high degree of confidence in success. The aquifer possesses good characteristics that would allow for a relatively simple and straight-forward design. Adequate control of groundwater beneath the Ruco property could be established through the use of a system of extraction and monitoring wells. The treatment systems required in these alternatives would all be the same. Many standard water treatment technologies exist that have been employed ar other sites. It would be expected that these same technologies would be able to treat the groundwater at this site.

However, because of the presence of the TICs in the groundwater, there exists a degree of uncertainty in the application of standard technologies. Therefore, treatability studies would be required to determine the optimum technology or combination of technologies to treat all the contaminants in the groundwater. This factor makes the groundwater pump and treat alternatives slightly more difficult technically than non-treatment alternatives to implement.

Deep Soils

Alternative 1 has no technical or construction requirements making it the easiest alternative to physically implement. Alternative 2, capping, is also a very easy technology to implement and has been used at many sites across the country. The cap would require long term maintenance and periodic inspections by the agencies to ensure it's integrity. This would certainly restrict any future potential uses of the property. Alternatives 3 and 4 would be only slightly more difficult to implement from a technical stand-point. With Alternative 3, the same long-term requirements for the maintenance of the cap would exist that have been identified for Alternative 2, above. Alternative 4 would require some additional testing to ensure sufficient recapture of the water being flushed through the sump(s). Alternative 4 would also have to be integrated with the groundwater extraction and treatment (Alternative 5 or 6 for groundwater) system, therefore, any difficulties in implementing those alternatives would be applicable here. These alternatives would require more design and construction work but both use well established technologies. Construction of either alternative is not expected to be a problem.

Shallow Soils

Alternative 1, no action, would be the technically simplest alternative. No design, construction, or monitoring requirements are involved. Alternative 2 would be easy to design and construct however, long-term maintenance, inspection and therefore agency involvement would be required. Alternative 3 could be completed using simple, widely utilized excavation techniques, with some minor modifications to ensure the proper dust suppression was executed.

o <u>Cost</u>

The costs for all of the alternatives are presented in the description of the Summary of Alternatives Section above. For comparison purposes the costs of the various alternatives are presented as follows:

Groundwater

Looking at the various groundwater alternatives, Alternative 1, no action, presents the lowest costs at $ 0 for capital, present-worth and O&M. This alternative provides a baseline to compare the costs of other alternatives. Alternative 2 is the next least expensive alternative to implement with a capital cost of $ 39,000, 10-year and 30-year present worth costs of $ 325,000 and $ 608,000 respectively, and an O&M cost of $37,000 annually. The costs associated with Alternatives 3 and 4 are very similar. The capital costs for Alternative 3 are $ 4,748,000 and $4,867,000 for Alternative 4. The O&M costs are $ 549,000 for both alternatives. Alternative 4 has slightly higher costs for the present worth analysis at $ 9,105,000 for the 10-year estimate and $13,304,000 for the 30-year estimate. Alternative 3 has estimated 10 and 30-year present worth costs at $ 8,986,000 and $ 13,185,000 respectively. A list of the alternatives assembled in increasing order of cost indicates that Alternative 1 is the least expensive, followed by Alternatives 2, 3, and 4.

Deep Soils

Alternative 1 is the least expensive alternative evaluated with $ 0 capital costs, $ 0 O&M costs and $ 0 present worth costs. Alternatives 2, 3 and 4 have two sets of costs associated with each alternative based on the need for addressing Sump 1 alone, or Sump 1 and Sump 2 together. Alternative 2, capping, has an associated capital cost of $ 213,000, an O&M cost of $ 5,000 per year and 10 and 30-year present worth costs of $ 251,000 and $ 289,000 for Sump 1. If Sump 2 is added to this alternative, the costs are: $ 345,000 capital cost, $ 7,000 annual O&M cost and 10-year and 30-year present worth costs of $ 396,000 and $ 446,000. Alternative 3 would be the highest cost alternative with a capital cost of $ 332,000, O&M cost of $ 48,000 and 10-year and 30-year present worth costs of $ 703,000 and $ 1,070,000 for Sump 1 alone. For Sump 1 and Sump 2, Alternative 3 would have the following costs: capital cost of $ 515,000, annual O&M cost of $ 56,000, a 10-year present worth cost of $ 948,000 and a 30-year present worth cost of $ 1,378,000. Alternative 4 was the least expensive alternative that incurred any costs. To address Sump 1, Alternative 4 was estimated to require a capital cost investment of $ 16,000 and an annual O&M cost of $ 1,000, and incur 10 and 30-year present worth costs of $ 26,000 and $ 37,000. To address Sump 1 and Sump 2 the capital cost of Alternative 4 would be $ 25,000. The annual O&M cost would be $ 3,000 and the 10-year and 30-year costs would be $ 45,000 and $ 65,000.

Shallow Soils

The costs developed for the shallow soils alternatives show that the no action alternative, Alternative 1, has $ 0 capital costs, $ 0 O&M costs, and $ 0 present worth costs. Alternatives 2 and 3 generated two sets of costs for each alternative based on addressing the former drum storage area alone, or the former drum storage area and the area around monitoring well E together. The costs required for the construction and operation of Alternative 2 in the former drum storage only are $ 86,000 capital costs, $ 3,000 per year O&M costs, and $ 107,000 and $ 128,000 10 and 30-year present worth costs. If the area around monitoring well E is also included, Alternative 2 would then cost $ 95,000 for capital cost, $ 3,000 annual O&M cost, $ 121,000 10-year present worth cost and $ 146,000 30-year present worth cost. Alternative 3, excavation and off-site disposal, was the most expensive alternative. To address the former drum storage area alone, a capital cost of $ 482,000 would be incurred. This alternative would not require annual O&M cost, which would therefore be $ 0. The present 10-year and 30-year present worth costs would represent a one-time investment cost of $ 482,000. To include the area around monitoring well E in the excavation and disposal, the capital cost would be $ 758,000, with annual O&M costs again equalling $ 0. The 10 and 30-year present worth costs would be $ 758,000.

o State Acceptance

After review of all available information the NYSDEC has indicated that they do support the selection of the preferred alternative.

o Community Acceptance

Community acceptance of the preferred alternative will be assessed in the Responsiveness Summary portion of the ROD following review of the public comments received on the RI/FS report and the Proposed Plan.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and the NYSDEC recommend Alternative 3, groundwater extraction and treatment with discharge to an on-site sump, for the groundwater; in conjunction with Alternative 4, soil flushing, for the deep soils. Alternative 3, excavation, is the preferred alternative to address the shallow soils. The key components of the preferred alternative as the preliminary choice for the Site remedy include the following:

o Groundwater extraction to control the movement of contaminated groundwater from migrating downgradient past the southern Ruco property boundary. The control of the groundwater would be achieved through the installation of groundwater extraction wells. The exact number, size, depth and pumping rates of these wells would be determined in the remedial design of the preferred alternative. Existing monitoring wells on the Ruco property would be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for additional monitoring wells would be determined during the design and implementation of the groundwater extraction system.

o Treatment of the extracted groundwater with an on-site treatment system to achieve the appropriate discharge standards. The exact type of treatment technologies to be used and their effectiveness on TICs would be determined in the design phase through treatability studies. If the results of the treatability studies indicate the discharge standards can not be achieved, the preferred alternative will have to be revisited.

o Additional soil testing in the bottom of Sump 2 to determine if contaminants are present in the soils and to compare those levels to the soil cleanup criteria that is considered protective of groundwater quality. If contaminants are present at levels above the protection of groundwater criteria, the soils in Sump 2 will be addressed in the same manner as the soils in Sump 1.

o Discharge of treated groundwater primarily to a sump to be constructed in the northwest portion of the site, with a small portion to be diverted to Sump 1 and possibly Sump 2 (based on the results of the soil tests). The majority of the discharge would be required to be diverted to a sump in the northwest corner of the site to avoid overloading Sumps 1 and 2 and the groundwater extraction system. The method of discharging the treated water would be through a system of piping placed at or just below the soil surface. The details of the piping layout would be determined in the design phase. Discharged groundwater is expected to meet the appropriate discharge criteria through treatment (see treatment above).

o Soil flushing for the deep soils in Sump 1, and possibly Sump 2 (based on the results of the soil testing). The soils will be flushed by the discharge of treated groundwater. The contaminants flushed out by this process would be recaptured by groundwater extraction wells. The exact location, depth, size and pumping rates of the wells will be determined during the design phase of the preferred alternative. The contaminant levels in the sumps will be re-evaluated at the five-year review to determine the effectiveness of the flushing.

o Additional soil testing in the area around monitoring well E to determine if contaminants are present. If contaminants are present, the concentrations will be compared to the soil TBC cleanup criteria considered to be protective of groundwater quality to determine whether a significant potential contaminant source to the groundwater exists. If the contaminants are present above the protection of groundwater quality criteria, and exist in the shallow soils, the area around well E will be addressed in the same manner as the former drum storage area. If the contaminants are present in the deeper soils, further evaluation potential remedial alternatives would occur.

o Excavation of the shallow soils in the former drum storage area adjacent to plant 2 and possibly the area around monitoring well E (depending on the results of the soil testing). The extent of the excavation in the former drum storage area would be based on the results of the soil samples collected during the Remedial Investigation. The extent of the excavation in the area around monitoring well E would be based on samples collected during the pre-design or design phase.

o Periodic monitoring of the groundwater extraction system, to assure adequate control is maintained; periodic sampling of the groundwater treatment system discharge, to assure treatment standards are achieved; and periodic sampling of the groundwater and soils in Sump 1 and possibly Sump 2, to measure the progress of the preferred alternative in achieving the cleanup standards.

o Institutional controls in the form of deed restrictions and groundwater use restrictions at the Ruco property. The deed restrictions would be required to permanently prevent the Ruco property from residential development as long as contaminants remain on the property and the treatment systems are in place. Groundwater use restrictions in addition to the existing Nassau County Ordinance, would be implemented through deed restrictions as well. The use of groundwater for human contact would be restricted until such time as the groundwater beneath the site has been determined to be fully remediated.

The preferred alternative addresses the principle threats posed by contaminated groundwater beneath the Ruco property and at the downgradient property boundary, which are; the potential human health risk and prevention of further groundwater (sole source aquifer) contamination downgradient (source control). The implementation of the groundwater remedy also has the potential to return the aquifer to a usable quality. The preferred alternative combines the groundwater remediation with the soils remediation to address the principle threat posed by the soils, which is the further contribution to groundwater degradation from contaminants in the soil. This alternative also satisfies the statutory preference for treatment as a principal element to reduce the toxicity, mobility and volume of contaminants at the site. By addressing the shallow soils the preferred alternative also provides an unquantifiable, but added level of protection to site workers from potential exposure to contaminants and reduces the potential contribution to groundwater contamination.

The groundwater extraction and treatment portion of the preferred alternative is expected to meet the discharge to groundwater ARARs, however, some uncertainty does exist due to the presence of TICs. The same uncertainty exists for all extraction and treatment alternatives. The ARARs for groundwater quality would also be expected to be achieved with the preferred alternative, although the presence of groundwater contaminants upgradient of the site may make this goal impossible to reach.

The flushing of the soils in the sump(s) is also expected to achieve the TBC criteria for the soluble contaminants in the soils. The effectiveness of flushing on the more insoluble contaminants is unknown at this time, however, a small portion of these insoluble contaminants could be removed through flushing. Remaining insoluble contaminants would **not** be expected to readily leach from the soils and mobilize into the groundwater.

Excavation of the shallow soils would achieve the TBC criteria for protection of groundwater by removing the contaminants from the site. A reduction in the toxicity, mobility and volume of the contaminants would be achieved and the leaching of contaminants into the groundwater would be prevented.

Groundwater extraction and treatment, soil flushing and excavation would provide long-term effectiveness in the protection of human health and the environment. The extraction and treatment of groundwater and the flushing of the soils in the sump(s) and excavation of shallow soils would also be permanent solutions through the removal of contaminants in the affected media. Capping of soils is not considered permanent because the contaminants are left in place.

It is anticipated that the groundwater extraction and treatment portion of the preferred alternative would effectively reduce the mobility and volume of the contaminated groundwater. Uncertainty does exist concerning the ability of the treatment system to achieve the appropriate treatment standards. The ability to achieve the standards through treatment would be determined in the pre-design phase by treatability tests. Depending on the treatment technology chosen, the toxicity of the contaminants may also be reduced through destruction. The contaminants in the deep soils would initially become more mobile as they are flushed out of the soils reducing the volume of the compounds in the soil. The contaminants would then be recaptured and treated in the groundwater treatment system, permanently reducing their volume, mobility and potentially their toxicity.

It is not anticipated that any significant short-term impacts on human health or the environment would occur during the construction and implementation of the preferred alternative. The cleanup goals for the pumped and discharged groundwater are expected to be met once the treatment system begins operation. It is uncertain if, or how long, it would take to restore the aquifer to the groundwater standards. It is also uncertain if the soil TBC goals would be achieved for all of the contaminants in the soils. The shallow soils would achieve the TBC soils criteria upon completion of the excavation. The preferred alternative could be constructed and operational in less than a year.

The implementation of the preferred alternative is both technically and administratively feasible. The alternative relies on established technologies that are widely used and available. The construction of the various components of the remedy could be accomplished without great difficulty and relatively quickly once the predesign/design work is completed.

The costs for the preferred alternative are as follows:

Groundwater extraction and treatment with discharge to on-site sumps: Capital cost $ 4,748,000, Annual O&M costs of $ 549,000, with 10-year and 30-year Present Worth costs of $ 8,986,000 and $13,185,000.

Soil flushing of Sump 1 only: Capital cost $ 16,000, Annual O&M costs of $ 1,000, with 10-year and 30-year Present Worth costs of $ 26,000 and $ 37,000.

Soil flushing of Sump 1 and Sump 2: Capital cost $ 25,000, Annual O&M costs of $ 3,000, with 10-year and 30-year Present Worth costs of $ 45,000 and $ 65,000.

Excavation of shallow soils in the former drum storage area only: Capital costs of $ 482,000. Annual O&M costs of $ 0, and 10-year, 30-year present worth costs of $ 482,000 (one-time investment cost.)

Excavation of shallow soils in the former drum storage area and the area around monitoring well E: Capital costs of $ 758,000. Annual O&M costs of $ 0, and 10-year, 30-year present worth costs of $ 758,000 (one-time investment cost).

If all of the targeted areas are included (i.e. Sump 2 and the area around monitoring well E contain contaminants above the TBC values), the total cost of the remedies for operable unit one would be:

Capital cost: $ 5,531,000,

Annual O&M cost: $ 552,000,

10-year present worth cost: $ 9,031,000,

and 30-year present worth cost: $ 13,250,000.

The preferred alternative achieves the ARARs more quickly, or as quickly, and at less cost than the other options except for the shallow soils where excavation would cost more than the other alternatives. However, the excavation would be more permanent, require no O&M and would not require a five-year review. No contaminants in the shallow soil areas targeted would be left on-site. Therefore, the preferred alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and the NYSDEC believe that the preferred alternative will be protective of human health and the environment, will comply with ARARs, will be cost effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also will meet the statutory preference for the use of treatment as a principal element.

GLOSSARY
Of Terms and Acronyms Used In the Proposed Plan

This glossary defines the technical terms and acronyms used in this Proposed Plan. The terms and abbreviations contained in this glossary are often defined in the context of hazardous waste management, and apply specifically to work performed under the Superfund program. Therefore, these terms may have other meanings when used in a different context.

Acids: Substances, characterized by low pH (less than 7.0) that are used in chemical manufacturing. Acids in high concentration can be very corrosive and react with many inorganic and organic substances. These reactions may possibly create toxic compounds
or release heavy metal contaminants that remain in the environment long after the acid is neutralized.

Administrative Order on Consent (AOC): A legal and enforceable agreement between EPA and the potentially responsible parties (PRPs). Under the terms of the Order, the PRPs agree to perform or pay for site studies or cleanup work. It also describes the oversight rules, responsibilities and enforcement options that the government may exercise in the event of non-compliance by the PRPs. This Order is signed by the PRPs and the government; it does not require approval by a judge.

Administrative Order: A legally binding document issued by EPA directing the potentially responsible parties to perform site cleanups or studies.

Administrative Record File: The file containing all Site findings and reports that were considered in the Agency's decision regarding the preferred alternative. Typically these documents are available for public review at a convenient location within the town or city that a site is located as well as at EPA Region 2 headquarters.

Adsorption: The adhesion of molecules of a gas, liquid or dissolved matter to the surfaces of solid bodies or liquids with which they are in contact.

Air Stripping: A process whereby volatile organic chemicals are removed from contaminated material by forcing a stream of air through it in a pressurized vessel. The contaminants are evaporated into the air stream. The air may be further treated before it is released into the atmosphere.

Ambient air: Any unconfined part of the atmosphere. Refers to the air that may be inhaled by workers or residents in the vicinity of contaminated air sources.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called groundwater.

Backfill: To refill an excavated area with removed earth; or the material itself that is used to refill an excavated area.

Bioaccumulate: The process by which some contaminants or toxic chemicals gradually collect and increase in concentration in living tissue, such as in plants, animals, or humans as they breathe contaminated air, drink contaminated water, or eat contaminated food.

Bioremediation: A cleanup process using naturally occurring or specially cultivated microorganisms to digest contaminants naturally and break them down into nonhazardous components.

Borehole: A hole drilled into the ground used to sample soil and groundwater.

Cap: A layer of material, such as clay or a synthetic material, used to prevent rainwater from penetrating and spreading contaminated materials. The surface of the cap is generally mounded or sloped so water will drain off.

Carbon adsorption/carbon treatment: A treatment system in which contaminants are removed from groundwater and surface water by forcing water through tanks containing activated carbon, a specially treated material that attracts and holds or retains contaminants.

Carbon disulfide: A degreasing agent formerly used extensively for parts washing. This compound has both inorganic and organic properties, which increase cleaning efficiency. However, these properties also cause chemical reactions that increase its hazard to human health and the environment.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act

Consent decree: A legal document, approved and issued by a judge, formalizing an agreement between EPA and the potentially responsible parties (PRPs). The consent decree describes remedial actions that the PRPs are required to perform and/or the costs incurred and/or will be incurred by the government that the PRPs will reimburse, as well as the roles, responsibilities, and enforcement options that the government may exercise in the event of non-compliance by PRPs. If a settlement between EPA and the PRPs includes remedial actions, it must be in the form of a consent decree. A consent decree is subject to a public comment period.

Consent Order: A legal and enforceable agreement between EPA and the potentially responsible parties (PRPs). Under the terms of the Order, the PRPs agree to perform or pay for site studies or remedial work. It also describes the oversight rules, responsibilities and enforcement options that the government may exercise in the event of non-compliance by the PRPs. This Order is signed by the PRPs and the government; it does not require approval by a judge.

Containment: The process of enclosing or containing hazardous substances in a structure, typically in ponds and lagoons, to prevent the migration of contaminants into the environment.

Decommission: To revoke a license to operate and take out of service.

Degrease: To remove grease from wastes, soils, or chemicals, usually using solvents.

Dewater: To remove water from wastes, soils, or chemicals.

Downgradient/downslope: A downward hydrologic slope that causes groundwater to move toward lower elevations. Therefore, wells downgradient of a contaminated groundwater source are prone to receiving pollutants.

Effluent: Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Feasibility Study (FS): The second part of a two-part Remedial Investigation/Feasibility Study (RI/FS). The FS involves identifying and evaluating the most appropriate technical approaches for addressing contamination problems at a Superfund site.

Good faith offer: A voluntary offer, generally in response to a Special Notice letter, made by a potentially responsible party (PRP) that consists of a written proposal demonstrating their qualifications and willingness to perform a site study or cleanup.

Hazard Index: The Hazard Index reflects noncarcinogenic health effects for an exposed population and is the fraction of the chronic daily intake of a chemical divided by the calculated daily dose believed to be protective of human health including sensitive sub-populations. If the HI exceeds one (1.0), there is a possibility of adverse health effects.

Hot Spot: An area or vicinity of a site containing exceptionally high levels of contamination.

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Influent: Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

Landfill: A disposal facility where waste is placed in or on land.

Leachate: The liquid that trickles through or drains from waste, carrying soluble components from the waste.

Leach/Leaching: The process by which soluble chemical components are dissolved and carried through soil by water or some other percolating liquid.

Migration: The movement of contaminants, water, or other liquids through porous and permeable rock.

Mitigation: Actions taken to improve site conditions by limiting, reducing, or controlling toxicity and contamination sources.

NCP: National Contingency Plan

Neutrals: Organic compounds that have a relatively neutral pH, complex structure and, due to their organic bases, are easily absorbed into the environment. Naphthalene, pyrene, and trichlorobenzene are examples of neutrals.

Notice Letter: A General Notice Letter notifies the potentially responsible parties (PRPs) of their possible liability. A Special Notice Letter begins a 60-day formal period of negotiation during which EPA is not allowed to start work at a site or initiate enforcement actions against the PRPs, although EPA may undertake certain investigatory and planning activities. The 60-day period may be extended if EPA receives a good faith offer (see Good Faith Offer) within that period.

NPL: EPA's National Priorities List.

NYSDEC: New York State Department of Environmental Conservation.

O&M: Operation and maintenance.

Outfall: The place where wastewater is discharged into receiving waters.

Percolation: The downward flow or filtering of water or other liquids through subsurface rock or soil layers, usually continuing downward to groundwater.

Phenols: Organic compounds that are used in plastics manufacturing and are by-products of petroleum refining, tanning, textile, dye, and resin manufacturing. Phenols are highly poisonous and can make water taste and smell bad.

Plume: A body of contaminated groundwater flowing from a specific source. The movement of the groundwater is influenced by such factors as local groundwater flow patterns, the character of the aquifer in which groundwater is contained, and the density of contaminants.

Polycyclic Aromatic Hydrocarbons or Polyaromatic Hydrocarbons (PAHs): PAHs, such as pyrene, are a group of highly reactive organic compounds found in motor oil. They are common component of creosotes and can cause cancer.

Polychlorinated Biphenyls (PCBs): A group of toxic chemicals used for a variety of purposes including electrical applications, carbonless copy paper, adhesives, hydraulic fluids, microscope emersion oils, and caulking compounds. PCBs are also produced in certain combustion processes. PCBs are extremely persistent in the environment because they are very stable, non-reactive, and highly heat resistent. Burning them produces even more toxins. Chronic exposure to PCBs is believed to cause liver damage. It is also known to bioaccumulate in fatty tissues. PCB use and sale was banned in 1979 with the passage of the Toxic Substances Control Act.

Polyvinyl Chloride (PVC): A plastic made from the gaseous substance vinyl chloride. PVC is used to make pipes, records, raincoats, and floor tiles. Health risks from high concentrations of vinyl chloride include liver cancer and lung cancer, as well as cancer of the lymphatic and nervous system.

Potentially Responsible Parties (PRPs): Parties, including owners, who may have contributed to the contamination at a Superfund site and may be liable for costs of response actions. PRPs may sign a Consent Decree or Administrative Order on Consent (see Consent Decree and Administrative Order on Consent) to participate in site remedial activity without admitting liability.

Remedial Action (RA): A series of steps taken to monitor, control, reduce, or eliminate risks to human health and the environment. These risks were caused by the release or threatened release of contaminants at a Superfund site.

RD: Remedial Design

Remedial: A course of study combined with actions to correct site contamination problems through identifying the nature and extent of cleanup strategies under the Superfund program.

Remedial Investigation (RI): The first part of a two-part Remedial Investigation/Feasibility Study (RI/FS). The RI involves collecting and analyzing technical and background information regarding a Superfund site to determine the nature and extent of contamination that may be present. The investigation also determines how conditions at the site may affect human health and the environment through a risk assessment.

Record of Decision (ROD): The document that present EPA's final selection of a response action.

Runoff: The discharge of water over land into surface water. It can carry pollutants from the air and land into receiving waters.

Sediment: The layer of soil, and minerals at the bottom of surface waters, such as streams, lakes, and rivers that absorb contaminants.

Sludges: Semi-solid residues from industrial or water treatment processes that may be contaminated with hazardous materials.

SPDES: The New York State Pollution Discharge Elimination System.

Stripping: A process used to remove volatile contaminants from a substance (see Air Stripping).

Sumps: A pit or tank that catches liquid runoff for drainage or disposal.

Superfund: The common name for the federal program established by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended in 1986. The Superfund law authorizes EPA to investigate and remediate the nation's most serious hazardous waste sites.

Trichloroethylene (TCE): A stable, colorless liquid with a low boiling point. TCE has many industrial applications, including use as a solvent and as a metal degreasing agent. TCE may be toxic to people when inhaled, ingested, or through skin contact and can damage vital organs, especially the liver [see also Volatile Organic Compounds].

Unilateral Order: A legally binding document issued by EPA directing the potentially responsible parties to perform site cleanups or studies (generally, EPA does not issue unilateral orders for site studies).

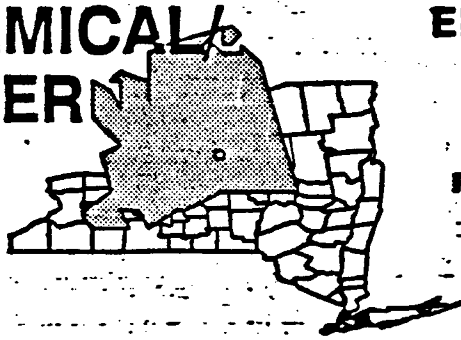
Upgradient/Upslope: Upstream; an upward slope. Demarks areas that are higher than contaminated areas and, therefore, are not prone to contamination by the movement of polluted groundwater.

UV: ultraviolet

Volatile Organic Compounds (VOCs): VOCs are made as secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and widespread industrial use, they are commonly found in soil and groundwater.

Wetland: An area that is regularly saturated by surface or groundwater and, under normal circumstances, capable of supporting vegetation typically adapted for life in saturated soil conditions. Wetlands are critical to sustaining many species of fish and wildlife. Wetlands generally include swamps, marshes, and bogs. Wetlands may be either coastal or inland. Coastal wetlands have salt or brackish (a mixture of salt and fresh) water, and most have tides, while inland wetlands are non-tidal and freshwater. Coastal wetlands are an integral component of estuaries.

HOOKER CHEMICAL/
RUCO POLYMER
CORP.
NEW YORK
EPA ID# NYD002920312

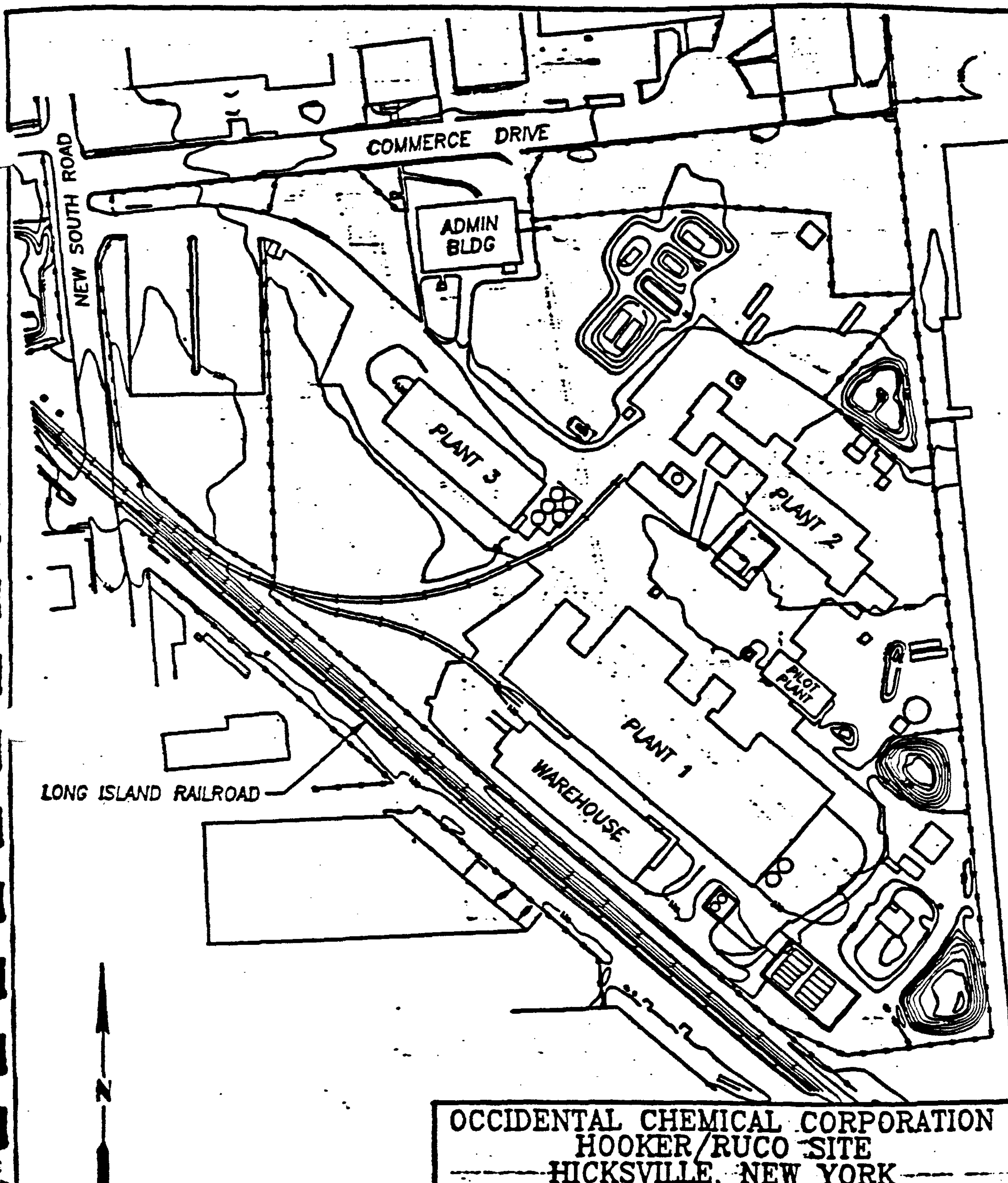


EPA REGION 2
Nassau County
Hicksville

Other Names:
Ruco Polymer Corp.

FIGURE 1

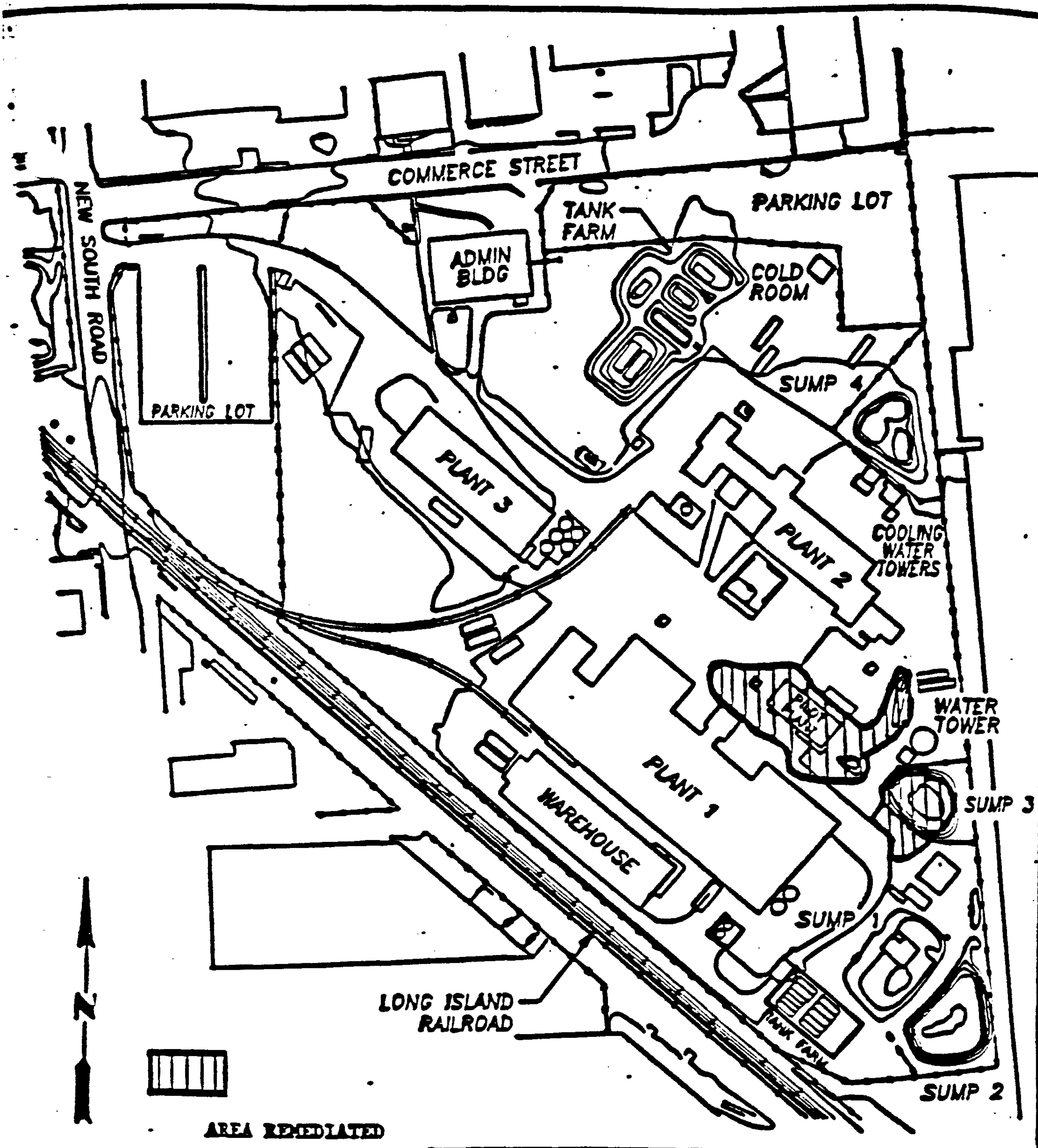
HKR 002 0658



OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

SITE BASE MAP

DATE	REVISED	
		PREPARED BY: LEGGETTE, BRASHEARS & GRAHAM, INC. Professional Ground-Water Consultants 72 Danbury Road Wilton, CT 06897 (203) 762-1207
		DATE: 7/29/92 FIGURE: 1.2



AREA REMEDIATED BY O U 2 REMEDIAL ACTION

0 150
SCALE IN FEET

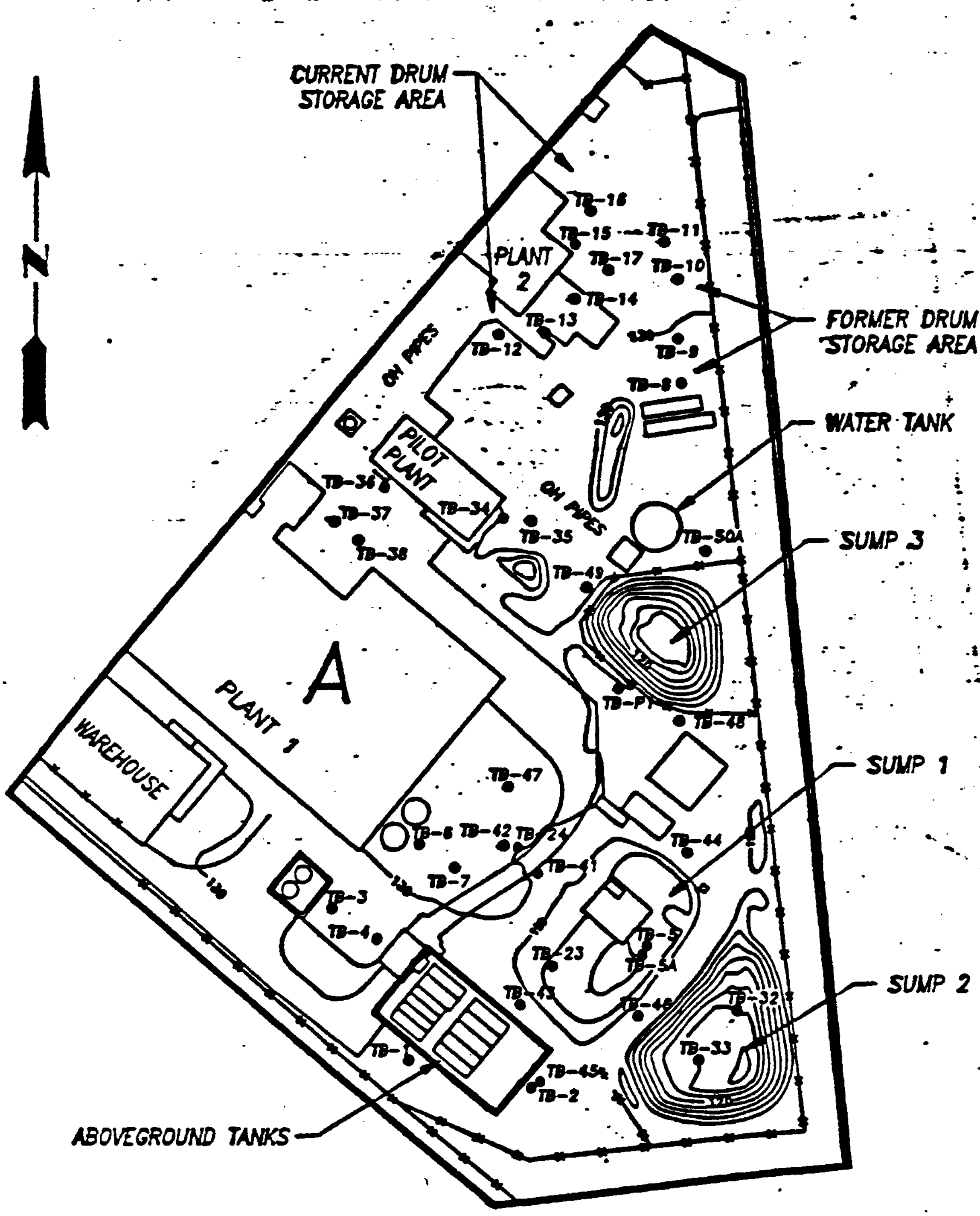
OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

AERIAL SITE MAP
3-13-89

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water Consultants
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE: 5/4/92 FIGURE: 2



LEGEND

● TEST BORING LOCATIONS

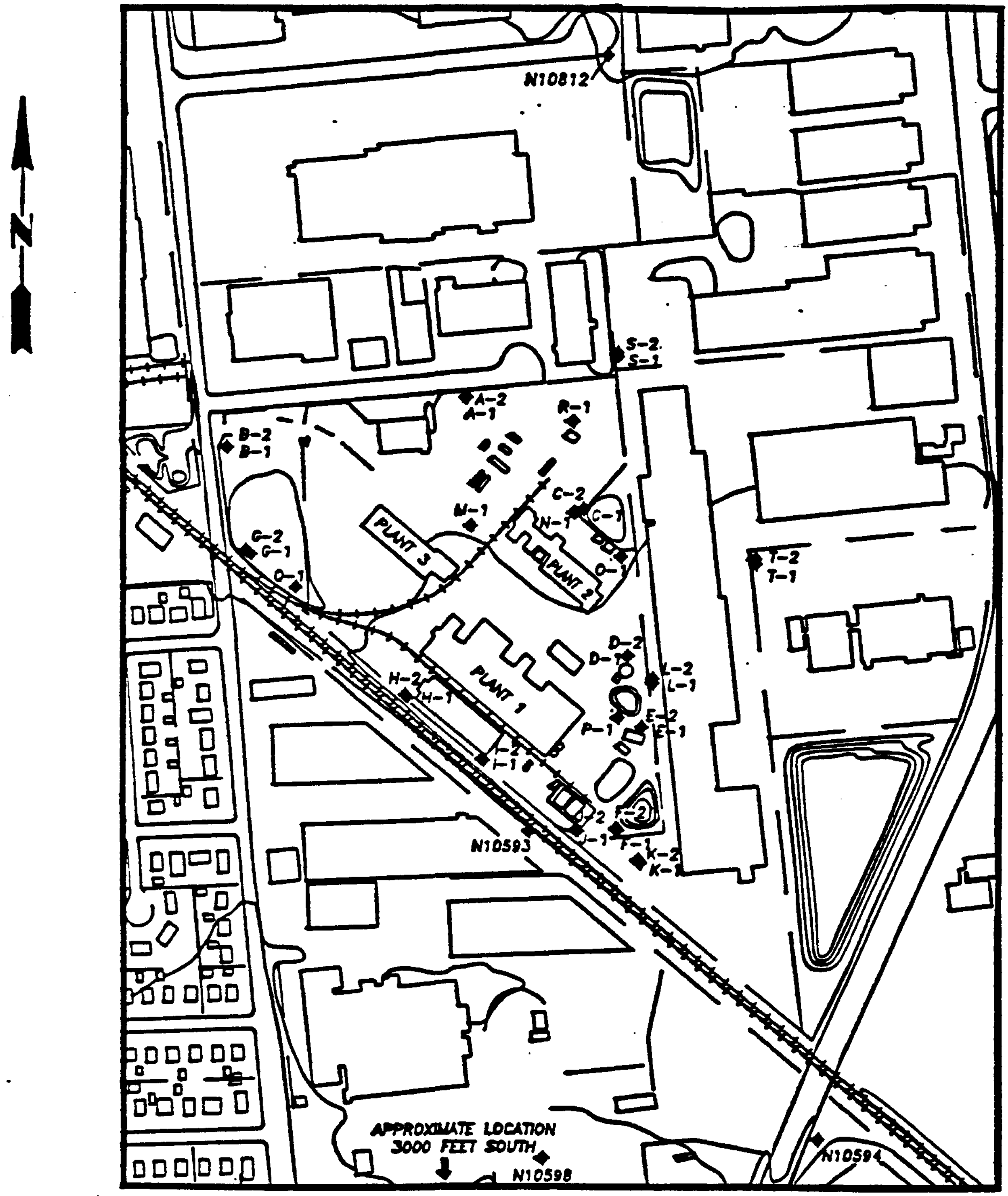
0 100
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

TEST BORING LOCATIONS SOUTH

DATE	REVISED	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM, INC. Professional Ground-Water Consultants 72 Danbury Road Wilton, CT 06897 (203) 762-1207
		DATE: 7/29/92 FIGURE: 3

HKR 002 0661



LEGEND

◆ WELL LOCATION

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

GROUND-WATER SAMPLING LOCATION

DATE	REVISED

PREPARED BY:
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DATE: 7/30/92 FIGURE: 4

HKR 002 0662